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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/761,500

01/20/2004

Sang Woo Nam

SPO200512-0108US

4370

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05/31/2007

THE LAW OFFICES OF ANDREW D. FORTNEY, PH.D., P.C.

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EXAMINER

BLAN, NICOLE R

ART UNIT

PAPER NUMBER

1709

MAIL DATE

DELIVERY MODE

05/31/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/761,500

Applicant(s)

NAM ET AL.

Examiner

Nicole Blan

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– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 19-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☒ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>01202004, 07142006, 02202007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1-18 drawn to methods in the reply filed on May 1, 2001 is acknowledged.

Claim Objections

2. Claims 8 and 18 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. The use of the terms insulating layer, dielectric layer, and conducting layer fail to further limit the claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 4-9, 11-12, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al. (U.S. Patent 6,387,190, hereafter '190), and further in view of Chang (U.S. Patent 6,423,147, hereafter '147).

Claims 1 and 12: '190 teaches a method for cleaning a semiconductor substrate having an etched pattern of lines or trenches thereon or therein [col. 4, lines 19-35] by supplying the aqueous cleaning solution [col. 9, lines 66-67] to the semiconductor substrate to remove [i.e. clean] the etch by-products [col. 4, lines 45-67 and col. 5, lines 1-5] from the pattern of lines or

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trenches [col. 10, lines 1-12]. It does not teach cooling the cleaning solution to a predetermined temperature lower than ambient or room temperature. However, '147 teaches cooling a cleaning solution to a predetermined temperature lower than ambient or room temperature [col. 3, lines 56-58 and col. 4, lines 1-5] and supplying the cooled solution to a semiconductor [col. 3, lines 56-58] for cleaning. The selection of something based on its known suitability for its intended use has been held to support *prima facie* cases of obviousness. Therefore, it would have been obvious to one of ordinary skill in the art of semiconductors at the time the invention was made to have used the cooled solution of '147 as the particular solution of '190 with a reasonable expectation of success because '147 teaches a suitable means to prevent damage to the semiconductor by using a cooled cleaning solution.

Claim 4: '190 and '147 teach the limitations of claim 1 above. '147 also teaches using a predetermined temperature lower than 20°C [col. 3, lines 56-58 and col. 4, lines 1-5].

Claims 5 and 6 are rejected over '190 and '147 for the reasons applied to claim 4 above.

Claim 7: '190 and '147 teach the limitations of claim 1 above. '190 also teaches that the cleaning step comprises rotating the semiconductor substrate for between several seconds and several minutes, while delivering the cleaning solution to the rotating semiconductor substrate [col. 9, lines 66-67 and col. 10, lines 1-12].

Claim 8: '190 and '147 teach the limitations of claim 1 above. '190 also teaches that the etched pattern is formed from or in a metal layer [col. 4, lines 19-35].

Claim 9: '190 and '147 teach the limitations of claim 8 above. '190 also teaches that the etched pattern comprises a single layer of material [col. 4, lines 19-35].

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Claim 11: '190 and '147 teach the limitations of claim 8 above. '190 also teaches that the etched pattern comprises copper [col. 4, lines 19-35].

Claim 16 is rejected over '190 and '147 as applied to claim 12 above, and further in view of '147 for the reasons applied to claim 9 above.

Claim 18 is rejected over '190 and '147 as applied to claim 12 above, and further in view of '190 as applied to claim 11 above.

5. Claims 2-3, and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over '190 and '147, and further in view of Konishi et al. (U.S. Patent 6,227,212, hereafter '212).

Claim 2: '190 and '147 teach the limitations of claim 1 above. They do not teach that the cleaning solution comprises hydrofluoric acid (HF). However, '212 teaches that the cleaning solutions for semiconductors may comprise hydrofluoric acid (HF) [col. 5, lines 64-65 and col. 6, lines 66-67]. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. Therefore, it would have been obvious to one of ordinary skill in the art of semiconductors that the solution comprising HF as taught by '212 could be used as the solution in '190 since, '212 teaches that using an HF solution cleans residues from semiconductor substrates.

Claim 3: '190 and '147 teach the limitations of claim 1 above. '212 teaches a solution that comprises a mixture of water and hydrofluoric acid [col. 5, lines 59-67].

Claim 13 is rejected over '190 and '147 as applied to claim 12 above, and further in view of '212 for the reasons applied to 3 above.

Claim 14 is rejected over '190, '147, and '212 as applied to claim 13 above, and further in view of '147 for the reasons applied to claim 5 above.

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Claim 15 is rejected over '190, '147, and '212 as applied to claim 13 above, and further in view of '147 for the reasons applied to claim 6 above.

6. Claims 10 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over '190 and '147, and further in view of Cathey, Jr. (U.S. Patent 5,185,058, hereafter '058).

Claim 10: '190 and '147 teach the limitation of claim 8 above. They do not teach that the etched pattern comprises a multi-layer structure. However, '058 teaches an etched pattern on a multi-layer structure [col. 2, lines 39-56]. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. Therefore, it would have been obvious to one of ordinary skill in the art of semiconductors that multi-layered structured taught by '058 could be used as the structure of '190 since, '058 teaches a device comprising an etched pattern multi-layered structure.

Claim 17 is rejected over '190 and '147 as applied to claim 12 above, and further in view of '058 for the reasons applied to claim 10 above.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Inoue et al. (U.S. PGPub 2003/0019426A1) teaches rotating means. Atoh (U.S. PGPub 2002/0007840 A1) teaches rotating means and an aqueous solution. Oguri et al. (U.S. Patent 6,409,576) teaches rotating means and an aqueous solution. Imaoka et al. (U.S. Patent 6,290,777 B1) teaches a low temperature for a prolonged period of time and a hydrofluoric acid solution. Furusawa et al. (U.S. Patent 6,220,935 B1) teaches a low temperature. Otsuki et al. (U.S. Patent 6,419,757) teaches a hydrofluoric acid solution. Ohmi et al. (U.S. Patent 6,416,586) teaches various solutions and prolonged time periods of cleaning.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicole Blan whose telephone number is 571-270-1838. The examiner can normally be reached on Monday - Thursday 7:30-5 and Friday 7:30-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NRB



MICHAEL B. CLEVELAND
SUPERVISORY PATENT EXAMINER